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Autodesk's Idea to Knit the Hyperloop Out of Carbon Fiber

By [Ashlee Vance](#) October 31, 2013

Elon Musk tantalized the world in August with his plans for the Hyperloop, a mode of travel that would blast people between cities at 800 miles per hour in capsules zipping through an above-ground tube. In a 58-page report, Musk, the chief executive officer of Tesla Motors ([TSLA](#)) and SpaceX, outlined his vision for the technology, which would use supercharged electric motors for propulsion. Musk's paper called on the public to help refine the design and bring the Hyperloop to fruition. Armchair advisers have since arrived en masse.

Most of the helpful suggestions have centered on perfecting the performance and the look of the people-carrying pods inside the Hyperloop. At Autodesk ([ADSK](#)), the San Rafael (Calif.)-based company whose computer-aided design software is used by everyone from architects to carmakers, Jordan Brandt zeroed in on the design of the tube and came up with a novel means of manufacturing it. "Elon has done a great job working on the aerodynamics of the capsule and the energy requirements—the things you would expect," says Brandt. "I found there wasn't as much creativity put into the infrastructure part, which is the most expensive part. It seemed like we were almost obligated to pitch our approach."

The tube in Musk's plan is made out of prefabricated steel sections that must be welded together. Critics have pointed out that could leave the Hyperloop prone to air leaks, which would undermine the internal low-pressure system it needs to run. Brandt, who studied building technology at Harvard University and holds the title of technology futurist at Autodesk, proposes making the tube out of one very long stretch of braided carbon fiber infused with an epoxy resin. The strong, lightweight material is used to make everything from jumbo jets to race cars.

There are machines that can churn out limited qualities of the braided carbon fiber. Brandt envisions building a supersize version and mounting it onto a rig loaded with reels of carbon fiber so it could roll along the Hyperloop's route. Working at a rate of 1 meter per minute, this factory on wheels could weave a Hyperloop tube from Los Angeles to San Francisco in less than two years, and, says Brandt, require fewer support pylons. "Elon's estimate calls for about \$2.6 billion for concrete, but we'd get that down to more like \$1.5 billion," he says.

Autodesk has run computer simulations of Brandt's design, and there's evidence it may work. "The machines that can do this exist," he says. "It's just a matter of bulking up the technology." Musk plans to build a small prototype of the Hyperloop to test out the propulsion technology. Other aspects of the project will begin to take shape now that a new corporation has been established to turn Musk's concept into a business. Yet even if the Hyperloop never becomes reality, it's a good bet the world will find uses for innovations it inspired.

The bottom line: Autodesk's Jordan Brandt has created a blueprint for a machine that would knit the Hyperloop's tube out of carbon fiber.